



## Higher National Unit specification

### General information

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

**Unit code:** HJ3Y 34

**Superclass:** XQ

**Publication date:** March 2017

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

This Unit is designed to provide the underpinning knowledge to enable learners to acquire the standards of competency at operational level for officers in charge of an engineering watch under the current Standards of Training, Certification and Watch keeping STCW 2010 Convention Section A-111/1.

### Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Explain marine auxiliary equipment and system components.
- 2 Explain routine and emergency operational procedures for marine auxiliary systems.

### Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

### Recommended entry to the Unit

Entry is at the discretion of the centre. Learners could have completed the NQ Unit *Marine Engineering Practice: An Introduction* (F9K6 12) at SCQF level 6. Learners could also have had some relevant industrial experience within a marine environment.

## Higher National Unit specification: General information (cont)

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

### Core Skills

There are opportunities to develop the Core Skills of *Communication, Problem Solving and Working with Others* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

### Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>)

### Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## Higher National Unit specification: Statement of standards

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### Outcome 1

Explain marine auxiliary equipment and system components.

#### Knowledge and/or Skills

- ◆ Layout of marine auxiliary systems
- ◆ Types of marine auxiliary equipment
- ◆ Operating principles of marine auxiliary equipment
- ◆ Construction of marine auxiliary equipment

### Outcome 2

Explain routine and emergency operational procedures for marine auxiliary systems.

#### Knowledge and/or Skills

- ◆ Starting and stopping of marine auxiliary systems
- ◆ Routine and emergency operational procedures
- ◆ Routine maintenance procedures
- ◆ Routine testing of fire safety equipment
- ◆ Routine and emergency testing steering gear
- ◆ Pollution prevention procedures
- ◆ Paralleling of electrical generation plant

### Evidence Requirements for this Unit

Written and/or oral evidence for Outcomes 1 and 2 could be combined to one assessment which will be assessed under closed-book supervised conditions of two hours duration.

Outcomes 1 and 2 could also be assessed separately each consisting of a single assessment, each lasting one hour which will be assessed under closed-book supervised conditions.

## Higher National Unit specification: Statement of standards (cont)

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

### Outcome 1

Learners are required to provide written and or/oral evidence to demonstrate their Knowledge and /or Skills for auxiliary systems from the following list:

- 1 Air conditioning and refrigeration systems
- 2 Sewage systems
- 3 Freshwater generations, domestic fresh water system
- 4 Steering gear system
- 5 Auxiliary steam or thermal boilers
- 6 Compressed air systems
- 7 Pollution prevention system

Learners are required to provide evidence to demonstrate their Knowledge and/or Skills for three different types of auxiliary systems from the above list. Learners will not have prior knowledge of which items are being assessed. Those items which are not sampled must be covered in the alternative (resit) assessment. Learners are required to complete all of the Knowledge and/or Skills.

Learners should with reference to seven marine auxiliary systems provide evidence they can:

- ◆ describe with the aid of a sketch the construction of one type of auxiliary system.
- ◆ describe the operation of one type of auxiliary system.
- ◆ sketch and describe the layout of one pumping system:
  - Bilge system
  - Ballast system
- ◆ sketch and describe the operation of one of the following:
  - fixed fire-fighting installation (CO<sub>2</sub>, Water mist, foam)
  - fire detection equipment (ionisation, optical, rate of rise)
- ◆ describe electrical generation and distribution systems.

### Outcome 2

Learners are required to provide evidence to demonstrate their Knowledge and/or Skills for three of the seven auxiliary systems from the list in Outcome 1. Learners will not have prior knowledge of which items are being assessed. Those items which are not sampled must be covered in the alternative (resit) assessment. Learners are required to complete all of the Knowledge and /or Skills.

Learners should with reference to seven types of marine auxiliary systems provide evidence they can:

- ◆ explain the operational procedures for starting and stopping auxiliary equipment.
- ◆ describe the maintenance and safety considerations for one auxiliary system.
- ◆ describe the testing of fire safety equipment.
- ◆ explain the procedures for the paralleling of electrical generating plant.
- ◆ explain the pollution prevention procedures.



## Higher National Unit Support Notes

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

### Guidance on the content and context for this Unit

The content of this Unit is designed to give the learner the knowledge of the various types of auxiliary systems that they may come across whilst at sea. Also provide the under-pinning knowledge to enable learners to acquire the standards of competency at operational level for officers in charge of an engineering watch under the Standards of Training, Certification and Watch keeping 2010 Convention section A-111/1.

Outcome 1 examines the various auxiliary systems that may be fitted to ships, their construction and the safety and pollution prevention equipment fitted.

Outcome 2 examines the procedures employed in the starting and shutdown of the various types of auxiliary systems. They will also be tutored in the diagnosis of common operational faults and machinery failures and the procedures to be adopted in order to rectify the problem.

### Guidance on approaches to delivery of this Unit

This unit should be delivered by a combination of whole class teaching and visits to college workshops where appropriate. Simulators can also be used to help reinforce knowledge gained in the classroom. Formative assessment and exercises in a simulator can also be used to help learners practise what they have learned.

If the centre has engine room simulator(s) then they may decide to use these for the delivery and/or assessment of Outcome 2.

### Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

## Higher National Unit Support Notes (cont)

**Unit title:** Marine Engineering: Auxiliary Systems (SCQF level 7)

Written and/or oral evidence for Outcomes 1 and 2 could be combined to form one assessment which will be assessed under closed-book supervised conditions of two hours duration.

Outcome 1 could consist of a single paper of four structured questions which will be assessed under closed-book supervised conditions of one hour duration. The questions will cover three auxiliary systems and will cover the construction, operation and system layout of the plant.

The question paper for Outcome 2 could consist of four questions which will be assessed under closed-book supervised conditions of one hour duration. The questions must cover three auxiliary systems and include procedures for start-up, shutdown and maintenance.

Alternatively engine room simulator(s) can be used for the delivery and/ or assessment of this unit. Where simulator(s) is used for assessment purposes, the assessment instrument should be structured and evidence recorded. Centres could carry out simulator exercises to test the learner's knowledge this could be done over a number of sessions, these should be able to be scored and results recorded.

### Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

### Opportunities for developing Core and other essential skills

There are opportunities to develop the Core Skills of *Communication*, *Problem Solving* and *Working with Others* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

## History of changes to Unit

| Version | Description of change | Date |
|---------|-----------------------|------|
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## General information for learners

### Unit title: Marine Engineering: Auxiliary Systems (SCQF level 7)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

On completion of this Unit you will have acquired knowledge of the different types of propulsion plant and their systems to be found on ships at sea.

You will have appreciation of the myriad of different arrangements of the systems that are required to support propulsion plant. You will learn the main features of these systems.

You will gain knowledge of the typical procedures required to start the different types of auxiliary plant and also how to shut them down. You will study the different common operational faults and mechanical failures that can occur with the different types of plant, and how to rectify them.

You will gain an understanding of ships auxiliary systems, the ability to read and understand ships pipeline drawings and be able to describe how the systems work.

There are two Outcomes of study in this Unit:

- 1 Explain marine auxiliary equipment and system components.
- 2 Explain routine, emergency and operational procedures for marine auxiliary equipment.

Outcome 1 could consist of a single assessment consisting of seven questions covering the construction, operation of auxiliary systems. The assessment will be of one hour duration and will be under supervised closed-book conditions.

Outcome 2 could be a single assessment consisting of seven structured questions. The assessment of this Outcome will last for one hour and will be carried out under supervised closed-book conditions.

Alternatively centres could use a simulator exercises to test your ability to:

- ◆ examine the procedures employed in the starting and shutdown of the various types of auxiliary systems; recognise operational problems and maintenance of marine auxiliary equipment.